

CLAIMS

What is claimed is:

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- 1 1. An orthopedic bone bolt and bone plate construct comprising:
 - 2 a) a bone plate member having at least one open portions,
 - 3 said open portions allowing placement of a series of fasteners therethrough
 - 4 at spaced apart positions along a length of the open portions;
 - 5 b) a series of fasteners attachable to said plate member at
 - 6 said open portions, at least one of said fasteners including a multi-angle
 - 7 fastener having a pair of fastener sections configured to be angled relative
 - 8 to one another;
 - 9 c) set multi-angle fastener comprising;
 - 10 - an upper section having a central longitudinal
 - 11 axis and an outer surface;
 - 12 - a lower section having a central longitudinal
 - 13 axis and an outer surface having bone
 - 14 attachment means configured to be surgically
 - 15 implantable into a patient's bone tissue;
 - 16 - joint means for connecting the upper and lower
 - 17 sections together, said joint means including
 - 18 corresponding mating surfaces configured to
 - 19 articulate with each other sufficiently to allow
 - 20 the upper and lower sections to angle relative to
 - 21 one another.

- 1 2. The construct of claim 1, wherein the mating surfaces include
- 2 corresponding concave and convex surfaces shaped to allow for a rotational

3 movement of the upper and lower sections, with the corresponding concave
4 and convex surfaces providing a semi-rigid connection within the multi-
5 angle fastener.

1 3. The construct of claim 2, wherein the rotational movement of
2 the upper and lower sections allows for a range on angulation in a range of
3 about between 20-70 degrees relative to the central longitudinal axes of the
4 upper and lower sections.

1 4. The construct of claim 1, wherein the mating surfaces include
2 a pair of flat surfaces, said flat surfaces each forming an angle with the axes
3 of the upper and lower sections when said axes are aligned, said flat
4 surfaces angled to allow for a rotational movement of the upper and lower
5 sections, with the pair of angled flat surfaces providing a rigid connection
6 within the multi-angle fastener,

1 5. The construct of claim 4, wherein the flat surfaces are angled
2 to allow for rotational movement in a range of about between 20-70 degrees
3 relative to the central longitudinal axes of the upper and lower sections.

1 6. The construct of claim 1, wherein the upper section includes
2 an externally threaded projection.

1 6. The construct of claim 1, further including a sleeve
2 configured to surround the joint means for holding together the upper and
3 lower sections at the joint means.

1 7. 8. The construct of claim 7, wherein the sleeve is cylindrical in
2 shape and includes an inner surface with threading on a portion of the inner
3 surface, said sleeve threading engaging a threaded portion on the outer
4 surface of the lower ^{section} portion of the fastener.

1 8. 9. The construct of claim 1, wherein the series of fasteners
2 includes at least two multi-angle fasteners.

1 10. The construct of claim 1, wherein the series of fasteners
2 includes at least one non-articulating bone bolt.

1 10. 11. An orthopedic bone bolt and spinal rod construct comprising:
2 a) a spinal rod connected to a plurality of rod/bolt
3 connectors, each connector having an open portion with each open portion
4 allowing placement of a fastener therethrough, the connectors being at
5 spaced apart positions along a length of the spinal rod;

6 b) a series of fasteners attachable to each of said
7 connectors at each said connector open portion, at least one of said fasteners
8 including a multi-angle fastener having a pair of fastener sections
9 configured to be angled relative to one another;

10 c) ^{said} set multi-angle fastener comprising;

- 11 - an upper section having a central longitudinal
12 axis and an outer surface; ^{an externally threaded projection}
13 - a lower section having a central longitudinal
14 axis and an outer surface having bone
15 attachment means configured to be surgically
16 implantable into a patient's bone tissue;

17 - joint means for connecting the upper and lower
18 sections together, said joint means including
19 corresponding mating surfaces configured to
20 articulate with each other sufficiently to allow
21 the upper and lower sections to angle relative to
22 one another.

1 11 12. The construct of claim 11, wherein the mating surfaces
2 include corresponding concave and convex surfaces shaped to allow for a
3 rotational movement of the upper and lower sections, with the
4 corresponding concave and convex surfaces providing a semi-rigid
5 connection within the multi-angle fastener.

1 12 13. The construct of claim 12, wherein the rotational movement
2 of the upper and lower sections allows for a range of angulation in a range
3 of about between 20-70 degrees relative to the central longitudinal axes of
4 the upper and lower sections.

1 13 14. The construct of claim 11, wherein the mating surfaces
2 include a pair of flat surfaces, said flat surfaces each forming an angle with
3 the axes of the upper and lower sections when said axes are aligned, said
4 flat surfaces angled to allow for a rotational movement of the upper and
5 lower sections, with the pair of angled flat surfaces providing a rigid
6 connection within the multi-angle fastener,

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15. The construct of claim 14, wherein the flat surfaces are angled
to allow for rotational movement in a range of about between 20-70 degrees
relative to the central longitudinal axes of the upper and lower sections.

16. The construct of claim 11, wherein the upper section includes
an externally threaded projection.

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17. The construct of claim 11 further including a sleeve
configured to surround the joint means for holding together the upper and
lower sections at the joint means.

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18. The construct of claim 17, wherein the sleeve is cylindrical in
shape and includes an inner surface with threading on a portion of the inner
surface, said sleeve threading engaging a threaded portion on the outer
surface of the lower ^{section} portion of the fastener.

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19. The construct of claim 11, wherein the series of fasteners
includes at least two multi-angle fasteners.

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20. The construct of claim 11, wherein the series of fasteners
includes at least one non-articulating bone bolt.

21. An orthopedic construct comprising:
a) a member with at least one attachment portions
allowing attachment of a series of fasteners thereto at spaced apart positions
along a length of the attachment portions;

- 5 b) a series of fasteners attachable to said member at said
6 attachment portions, at least one of said fasteners including a multi-angle
7 fastener having a pair of fastener sections configured to be angled relative
8 to one another;
9 c) set multi-angle fastener comprising;
10 - an upper section having a central longitudinal
11 axis and an outer surface;
12 - a lower section having a central longitudinal
13 axis and an outer surface having bone
14 attachment means configured to be surgically
15 implantable into a patient's bone tissue;
16 - joint means for connecting the upper and lower
17 sections together, said joint means including
18 corresponding mating surfaces configured to
19 articulate with each other sufficiently to allow
20 the upper and lower sections to angle relative to
21 one another.

22. A multi-angle fastener for use in connecting a bone portion
with a connecting member, said multi-angle fastener comprising:
a) an upper section having a central longitudinal axis and
an outer surface;
b) a lower section having a central longitudinal axis and
an outer surface having a bone attachment means configured to be
surgically implantable into a patient's bone tissue; and
c) joint means for connecting the upper and lower
sections together, said joint means including corresponding mating surfaces

10 configured to articulate with each other sufficiently to allow the upper and
11 lower sections to angle relative to one another.

1 ~~21~~²⁰ 23. The fastener of claim ~~22~~²⁰, wherein the mating surfaces include
2 corresponding concave and convex surfaces shaped to allow for a rotational
3 movement of the upper and lower sections, with the corresponding concave
4 and convex surfaces providing a semi-rigid connection within the multi-
5 angle fastener.

1 ~~22~~²¹ 24. The fastener of claim ~~23~~²¹, wherein the rotational movement of
2 the upper and lower sections allows for a range of angulation in a range of
3 about between 20-70 degrees relative to the central longitudinal axes of the
4 upper and lower sections.

1 ~~23~~²⁰ 25. The fastener of claim ~~22~~²⁰, wherein the mating surfaces include
2 a pair of flat surfaces, said flat surfaces each forming an angle with the axes
3 of the upper and lower sections when said axes are aligned, said flat
4 surfaces angled to allow for a rotational movement of the upper and lower
5 sections, with the pair of angled flat surfaces providing a rigid connection
6 within the multi-angle fastener,

1 ~~24~~²³ 26. The fastener of claim ~~25~~²³, wherein the flat surfaces are angled
2 to allow for rotational movement in a range of about between 20-70 degrees
3 relative to the central longitudinal axes of the upper and lower sections.

1 27. The fastener of claim 22, wherein the upper section includes
2 an externally threaded projection.

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1 28. The fastener of claim 22, further including a sleeve
2 configured to surround the joint means for holding together the upper and
3 lower sections at the joint means.

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1 29. The fastener of claim 28, wherein the sleeve is cylindrical in
2 shape and includes an inner surface with threading on a portion of the inner
3 surface, said sleeve threading engaging a threaded portion on the outer
4 surface of the lower ^{Section} portion of the fastener.